

Remarks

Election/Restrictions

The withdrawal of claims 42 and 52-58 as being directed to a non-elected species is traversed. Applicants had previously elected Species VII: (Figures 7A-7I). Dependent claim 42 and independent claim 52 recite the step of shaping the leads with a radius of curvature. This step is shown in Figure 7G, and described in the related description on page 21, lines 10-14, of the specification. Figure 7G is part of the elected species as outlined on page 2 of the Office Action dated October 18, 2001.

The Office Action dated March 29, 2002 states that claims 42 and 52-58 are related to the species of Figures 2D or 3B. This is incorrect. Figure 2D illustrates a contact 14A, and Figure 3B illustrates a contact 14B having leads 22A (Figure 2D) or 22B (Figure 3B) shaped with a radius of curvature. However, claims to the contacts 14A, 14B are not directed to the same species as claims directed to the method for making the contacts 14A, 14B. Support for this assertion is provided on page 18, line 33, to page 19, line 1, of the specification wherein it is stated: "Referring to Figures 7A-7I, steps in a method for fabricating the interconnect 10 (Figure 1) with the second embodiment contact 14B are illustrated."

Objections To Specification

The specification has been objected to due to a non-descriptive title and abstract. In response to these objections the title has been amended, and a new abstract has been provided on a separate sheet. Antecedent basis for the amended title and the new abstract is provided on page 5, line 24, to page 6, line 2, of the specification.

Rejections Under 35 USC §102 and 35 USC §103

Claims 34-35 have been rejected under 35 USC §102 as being anticipated by Grube et al. (US Patent No. 5,525,545).

Claims 38-41, 43 and 49-51 have been rejected under 35 USC §103(a) as being unpatentable over Grube et al. (US Patent No. 5,525,545) in view of Official Notice and Fjelstad et al. (US Patent No. 5,632,631).

The rejections under 35 USC §102 and 35 USC §103 are traversed for the reasons to follow.

Summary of the Invention

Independent claims 34, 39 and 49 are directed to a "method for fabricating an interconnect for a semiconductor component having a bumped contact". As shown in Figure 7A, the method includes the steps of: providing a substrate 12B, forming an insulating layer 24B on the substrate 12B, and forming a metal layer 54B on the insulating layer 24B.

As shown in Figures 7B and 7C, the method also includes the steps of etching the metal layer 54B to form blades 28B, and leads 22B (Figure 7H) with the blades 28A thereon. As shown in Figure 7H, the blades 22B include a peripheral connecting segment 40B. As shown in Figure 7D and 7E, the method also includes the steps of laser machining an opening 64B through the connecting segment 40B and through the substrate 12B. As shown in Figure 7E, the method also includes the steps of electrically insulating the opening 64B, forming a conductive material 66B in the opening 64B and forming a contact pad 38B on the substrate 12B.

As shown in Figure 7F, the method also includes the step of etching a recess 20B in the substrate 12B such that the leads 22B (Figure 7I) are cantilevered over the recess 20B. The leads 22B are sized and shaped to support a bumped contact 16 (Figure 3B) within the recess 20B, and to

flex in a z-direction within the recess 20B. In addition, as shown in Figure 7G, the method can include the step of shaping the leads with a radius of curvature R. In the completed contact 14B (Figures 7G and 3B), a conductive via 42B formed by the conductive material 66B and the laser machined opening 64B provides a straight line electrical path between the leads 22B and the pad 38B.

Argument

35 USC §102 Rejections Over Grube et al.

The 35 USC §102 rejections of claims 34-35 are traversed as the Examiner has not established a prima facie case of novelty. In this regard Figures 10A-10D and 12 of Grube et al. have been cited as anticipating claims 34-35. However, no analysis has been provided on how Figures 10A-10D of Grube et al. relate to the elements of claims 34-35. In rejecting claims the Examiner bears the initial burden of presenting a prima facie case. (See for example, In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992)). With the present 35 USC §102 rejections, the burden has not been met, such that the rejections are invalid on their face.

The 35 USC §102 rejections are further traversed because Grube et al. does not disclose all of the elements of claims 34-35. In this regard a proper 35 USC §102 rejection requires that a single reference teach (i.e., identically describe) each and every element or step of the rejected claim. (See for example, Jamesbury Corp. v. Litton Industrial Products, 756 F.2d 1556, 225 USPQ 253 (Fed. Cir. 1985)).

A first element of claim 34 not disclosed by Grube et al. is that the claim is directed to a "method for fabricating an interconnect for a semiconductor component having a bumped contact". Applicants are unable to locate any disclosure in Grube et al. of a fabrication method for

contacts configured to electrically engage bumped contacts of a semiconductor component.

A second element of claim 34 not disclosed by Grube et al. is the step of "forming a recess in the substrate proximate to the leads such that the leads cantilever over the recess and are configured to support the bumped contact and to move within the recess". In Grube et al. a substrate (support layer 400-Figure 10D) initially includes a recess (opening 406-Figure 10D) and a lead (finger 412-Figure 10D) cantilevered over the recess. However, in Figure 10G of Grube et al. the substrate is removed and replaced by an encapsulant on the lead (column 18, lines 32-48). Although an exposed contact 349 (Figure 10G) is formed, the contact 349 is not configured to support a bumped contact over a recess, and is not configured to move within a recess.

A third element of claim 34 not disclosed by Grube et al. is the step of "forming a plurality of leads on the substrate configured to electrically engage the bumped contact, each lead having a length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant". Admittedly, the fingers 412 in Grube et al. would inherently possess a spring constant, but there is no teaching of controlling the spring constant by selection of the length, the width, the thickness and the modulus of elasticity.

35 USC §102 Rejections Over Grube et al., Official Notice and Fjelstad et al.

The 35 USC §103 rejections over Grube et al., Official Notice and Fjelstad et al. are traversed, as the Examiner has failed to establish a prima facie case of obviousness.

MPEP 2142, 2143 set forth the three basic criteria for establishing a prima facie case of obviousness under 35 USC §103(a). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in

the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success in obtaining the claimed invention based upon the references relied upon by the Examiner. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

However, as argued with respect to the 35 USC §102 rejections, Grube et al. does not disclose a "method for fabricating an interconnect for a semiconductor component having a bumped contact", does not disclose the step of "forming a recess in the substrate proximate to the leads such that the leads cantilever over the recess and are configured to support the bumped contact and to move within the recess", and does not disclose the step of "forming a plurality of leads on the substrate configured to electrically engage the bumped contact, each lead having a length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant".

Grube et al. was also cited as teaching the step of forming a connecting segment as recited in claims 39 and 49. In the present case the connecting segment 40B (Figure 7I) functions to electrically connect "a plurality of leads" and the leads are stated to be "cantilevered over a recess and configured to support a bumped contact". Elements 50 (bonding portions 50-Figure 1) and 34 (terminal 34-Figure 1) in Grube et al. do not electrically connect a plurality of leads cantilevered over a recess, and such a function is not inherently performed or remotely suggested. Rather, the bonding portions 50 are connected to the contacts 24 of the chip (column 11, line 24-26).

Official Notice was cited as teaching the step of forming conductive vias by laser machining and filling with a conductive material. However, no reference has been cited as teaching this step in the context of the present connecting segment and substrate. In addition, it is difficult to envision a conductive via in Grube et al., or

what function it would perform in connection with the bonding portions 50 and terminals 34.

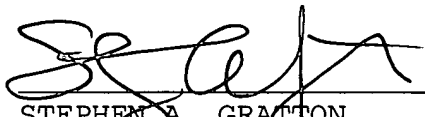
Fjelstad et al. was cited as teaching the step of "forming a plurality of projections" (columns 32-Figure 2). However, in the present case the projections are formed on leads cantilevered over a recess, which is not the case with the columns 32 of Fjelstad et al. Further, since the Grube et al. reference also does not disclose leads cantilevered over a recess, the combination of Grube et al. and Fjelstad et al. does not meet the limitation as required by the third criteria of the above MPEP rule.

Conclusion

In view of the above arguments and amendments, favorable consideration and allowance of claims 34-35, 38-43 and 49-58 is respectfully requested. An Information Disclosure Statement and a Petition For Extension Of Time (30 day) are being filed concurrently with this Amendment. Should any issues arise that will advance this case to allowance, the Examiner is asked to contact the undersigned by telephone.

Dated this 15th day of July, 2002.

Respectfully submitted:


STEPHEN A. GRATTON
Registration No. 28,418
Attorney for Applicants

2764 S. Braun Way
Lakewood, CO 80228
Telephone: (303) 989-6353
FAX (303) 989-6538

MARKED VERSION OF ABSTRACT SHOWING CHANGES



ABSTRACT

RECEIVED
JUL 26 2002
TECHNOLOGY CENTER 63700

[An interconnect for testing semiconductor components includes a substrate, and contacts on the substrate for making temporary electrical connections with bumped contacts on the components. Each contact includes a recess and a pattern of leads cantilevered over the recess configured to electrically engage a bumped contact. The leads are adapted to move in a z-direction within the recess to accommodate variations in the height and planarity of the bumped contacts. In addition, the leads can include projections for penetrating the bumped contacts, a non-bonding outer layer for preventing bonding to the bumped contacts, and a curved shape which matches a topography of the bumped contacts. The leads can be formed by forming a patterned metal layer on the substrate, by attaching a polymer substrate with the leads thereon to the substrate, or by etching the substrate to form conductive beams.]

A method for fabricating an interconnect for semiconductor components includes the steps of: providing a substrate; forming a metal layer on the substrate; etching projections in the metal layer; etching the metal layer to form patterns of leads; etching recesses in the substrate to cantilever the leads and form contacts for electrically engaging bumped contacts on a component; and then forming conductors to the leads. With the substrate comprising silicon, insulating layers can also be formed on the substrate, and within the recesses, for electrically insulating the leads and the conductors. With the conductors formed on a same surface of the substrate as the contacts, the same etching process can be used to form the conductors and the leads.



COPY OF PAPERS
ORIGINALLY FILED

RECEIVED
JUL 26 2002
TECHNOLOGY CENTER

MARKED VERSION SHOWING CHANGES TO AMENDED CLAIMS

39. (thrice amended) A method for fabricating an interconnect for a semiconductor component having a bumped contact comprising:

providing a substrate;

forming a metal layer on the substrate;

etching the metal layer to form a plurality of leads and a connecting segment electrically connecting the leads;

etching a recess in the substrate such that the leads are cantilevered over the recess and movable within the recess to electrically engage the bumped contact, each lead having a cantilever length, a width, a thickness and a modulus of elasticity selected to provide a desired spring constant; and

forming a conductive via in the substrate in electrical communication with the connecting segment.

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class mail in an envelope addressed to: Assistant Commissioner of Patents, BOX AMENDMENT (FEE), Washington, D.C. on this 15th day of July, 2002.

Jul 15, 2002
Date of Signature

Stephen A. Gratton
Stephen A. Gratton
Attorney for Applicants